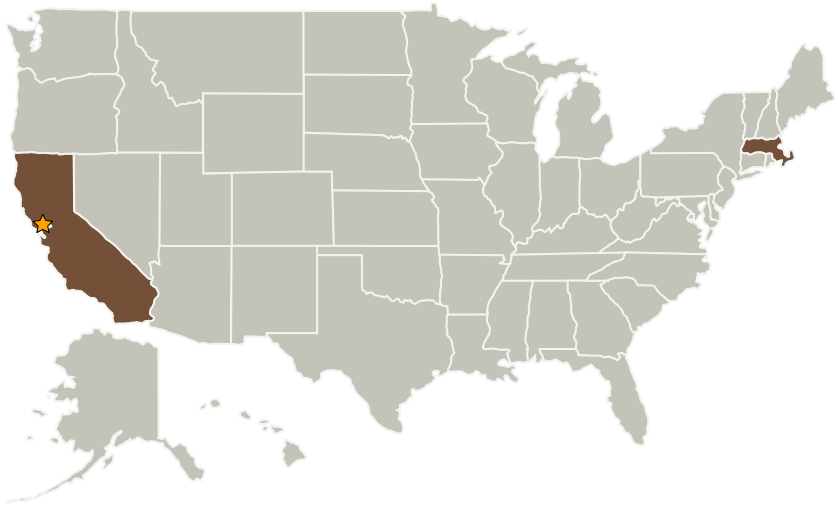
Pulsed Electrogasdynamic Thruster for Attitude Control and Orbit Maneuver, Phase I

Completed Technology Project (2008 - 2008)

Project Introduction

A new pulsed electric thruster, named "pulsed electrogasdynamic thruster," for attitude control and orbit maneuver is proposed. In this thruster, propellant gas is introduced into the thrust nozzle through a fast acting gas valve. When the propellant gas partially fills the thruster nozzle in 100~200 microsecond, a short, high voltage pulse is applied to break down and heat the propellant gas. The typical duration of the pulsed discharge is 10 microsecond. The heated propellant gas expands through the nozzle generating a high impulse (~mN-s per pulse) at a high specific thrust (120 micro N-s/joule). The specific impulse (Isp) will be in the range of 1000~1400 sec. This process can be repeated at a frequency which satisfies the spacecraft thrust requirement. The thrust generating mechanism of the proposed thruster is gasdynamic expansion, not magnetohydrodynamic interaction. The proposed thruster is different from the conventional pulsed electrothermal thruster in that the joule heating of the propellant takes place as the propellant gas expands through the divergent nozzle, thereby eliminating the heat and momentum losses at the nozzle throat. Our objectives are: (i) establish proof of concept; (ii) develop an engineering model; and (iii) develop a proto-flight model of the proposed thruster system.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Ames Research Center (ARC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Ames Research Center(ARC)	Lead Organization	NASA Center	Moffett Field, California
Physical Sciences, Inc.	Supporting Organization	Industry	Andover, Massachusetts

Primary U.S. Work Locations	
California	Massachusetts

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Takashi Nakamura

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.4 Electrothermal